Wood Purchasing Handbook

Hardwood Lumber & Plywood

Delivering the Difference

What you need.
When you need it.
By people that know and care.

"Educating customers to the product grading standards not only assists in proper wood buying decisions it also shows true industry leadership!"

Dana Spessert, Chief inspector
National Hardwood Lumber Association

www.nhla.com

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INTRODUCTION

Delivering what our clients need, when you need it, is essential for us to build a successful business relationship. With a goal to continually create value for you and as a demonstration of our commitment to integrity, we are pleased to present this information booklet. We hope it will be an easy and helpful guide that explains some of the important aspects of purchasing lumber and sheetgoods.

Our sales team will consult with you to understand your application, manufacturing process and business needs. This consultative approach enables us to deliver the correct product to you.

We welcome your feedback and hope that this booklet achieves our goal of making your purchasing experience an informed one.

PURCHASING CHECK LIST

There are a number of factors to consider when making an informed purchasing decision. For all raw material purchases, one should always consider the consistency of supply, quality and reliability of delivery.

Further there are specific things that should be considered when buying hardwood lumber and plywood as outlined below:

Hardwood

- Grading standards
- Tally method
- Geographical origin of product (region of growth)
- Color
- Specifications (eg. length, width, thickness, edging, end trimming)
- Packaging
- Moisture content

Plywood

- Grading standards
- Geographical origin of product (import or domestic)
- Quality of veneer
- Specifications (eg. color, core, consistency of panel thickness)
- Dimension (eg. 48.5"x96.5", 60.5"x109.5", 60.5"x120.5")
- Quality of sanding
- Type of veneer
- Cut and arrangement of veneer (PS, RC, WPF, Sequence Match, Book Match)

RECEIVING LUMBER

TALLY METHODS

Piece Tally

The most accurate method to determine net tally is to measure the width and length of each board. Computer piece tallies are often available from the mill, at your request.

Block Scale

Upon receipt of lumber, if a piece tally is not available or is too time consuming, a block scale is a good method for a quick estimate of tally. A good block scale will typically be a few percent higher than the actual tally. Block scale as follows:

1. Measure the average width of the bundle (in inches) accounting for the spaces.

2. Count the number of courses.

3. Determine the average length by estimating the percentage of cutbacks.

4. Multiply the average width by the number of courses by the average length and divide by 12, then multiply by the thickness.

$$\frac{\text{(avg width) x \# courses x (avg length)}}{12} \text{ x thickness}$$

PURCHASING ON NET TALLY OR GROSS TALLY

Net Tally is the lumber volume measured after kiln drying. Gross Tally is the lumber volume measured before kiln drying. The difference between the two is called shrinkage.

All species and thicknesses will shrink at different rates. After kiln drying, the industry will typically add back 8% (multiply by 1.08) to the Net Tally to calculate Gross Tally.

We will provide the tallies to you in the format you request.

There are benefits to purchasing on Net Tally:

1. **Time Saving**
   No need to add shrinkage for calculating quantity received and waste factors.
2. **Improved Accuracy**
   Tracking yields and costing inventory are based on actual quantity.
3. **Consistency in Purchasing**
   Not all suppliers use 8% for shrinkage, some add more and some add less. This can create problems when you are trying to accurately measure yields and when you are comparing prices. With Net Tally you eliminate the inconsistency of shrinkage.

Example of Net Tally and Gross Tally Methods
Using 4/4 lumber

Net Tally

$$\frac{\text{30 courses x 40" (avg width) x 10'}}{12} = \text{1000 FBM}$$

Net Price: $3240/per M FBM
Calculation: 1000 FBM x $3240/M
Total $: $3240

Gross Tally

$$\frac{\text{30 courses x 40" (avg width) x 10'}}{12} \text{ x 1.08 = 1080 FBM}$$

Gross Price: $3000/per M FBM
Calculation: 1080 FBM x $3000/M
Total $: $3240

MOISTURE CONTENT

The moisture content (MC) of wood is measured as a ratio of the weight of the water in the wood and the weight of the wood itself and is stated as a percentage. Freshly forest-cut "green" wood may have a moisture content of 30% to more than 100%, depending on the species.

It is important to note that after wood has been dried to the proper moisture content, it can change during storage, manufacturing or use as it tends to equalize to the local relative humidity. This is why metering of wood at all phases of use is critical and should always been done at the time of receiving. There are three primary types of moisture meters: pin type, surface type and electromagnetic. Electromagnetic meters provide the greatest accuracy for reading moisture content.

LUMBER GRADING BASICS

The National Hardwood Lumber Association (NHLA) sets minimum standards by which lumber is sorted into specific grades. Within the same grade, there is a range of quality and yields.

Understanding your needs and matching them to the correct product source can become extremely important in ensuring you obtain the best yields. The following information provides a quick overview from the NHLA Grade Rule Book for the grading of most hardwoods. Please speak to your Sales Representative if you wish to receive a complete copy of the NHLA Grade Rule Book. Our trained sales staff will consult with you to help you determine which is best for your specific application.

Grading is based on the size and number of clear cuttings that can be cut from a board. In rough lumber, the grade is then determined by using the poorest face.

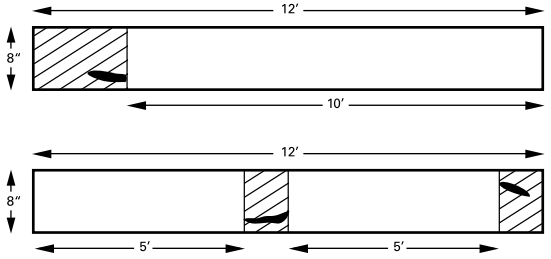
The minimum requirements for each grade are presented in descending order.

First and Seconds (FAS)
These boards yield 83 ⅓ % to 100% of clear wood cuttings on both faces of the board. These clear cuttings must be at least 3" wide by 7' long or 4" wide by 5' long. Although not sold alone, you can find FAS boards in FAS/IF.

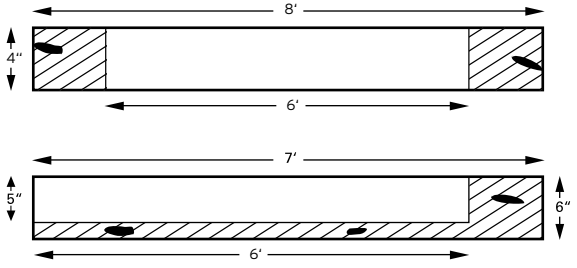
FAS One Face (FAS/1F)
In FAS/1F, the grade is a mix of FAS on one face, #1 Common on the reverse face. The best face of a 1F board must meet the requirements for FAS (able to yield 83 ⅓ % to 100% of clear wood cuttings that must be at least 3" wide by 7' long or 4" wide by 5' long). The reverse side must meet the grade of #1 Common (see below).

There is no minimum percentage of FAS required, unless buyer and seller agree otherwise.

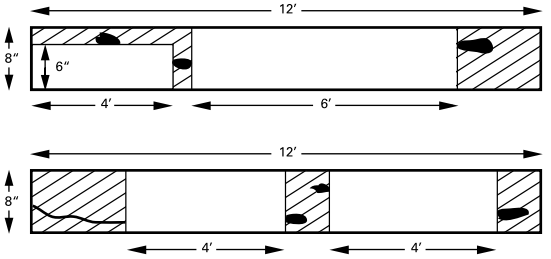
Examples of the better face:



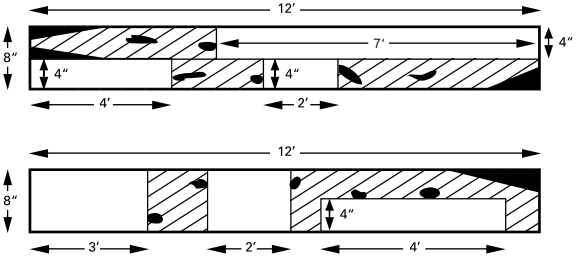
Selects
This grade is similar to FAS/1F. However, the clear cuttings have a different cutting unit dimension requirement. The clear cuttings must be 4" wide by 6' long.



#1 Common
This grade includes material that can yield from 66 ⅔ % up to 83 ⅓ % of clear wood cuttings. These clear cuttings must be at least 3" wide by 3' long or 4" wide by 2' long.



#2a Common
This grade includes material that can yield from 50% up to 66 ⅔ % of clear wood cuttings. These clear cuttings must be at least 3" wide by 2' long.



Wane Limitations in Lumber Grades

FAS/1F
- Better Face: ½ the length of the board maximum
- Back Face (1 common side): ⅓ width x ½ length (widest wane added together, length can be on both sides)

Selects: 6" & Wider Piece
- Better Face: ½ the length of the board maximum
- Back Face (1 common side): ⅓ width x ½ length (widest wane added together, length can be on both sides)

Selects: 4-5" & Wide Piece
- Both Faces: ⅓ width x ½ length (add widest wane together, and total length of wane from both edges)

1 Com through 3 Com
- No wane limitations.

COLOR SORTING IN HARDWOOD LUMBER

Although color is not considered when grading lumber, some mills will sort for color to meet specific end user requirements.

Sorting for color in hardwood lumber starts with separating sapwood from heartwood and finishes with checking for color consistency.

Sapwood: The living portion of the tree extending from the heartwood to the bark. Sapwood tends to be lighter than heartwood.

Heartwood: Extending from the pith to the sapwood, it is the dead portion of the tree and is a darker shade than sapwood.

Birch Color Grading

Sap and Better: Minimum of one face sapwood in the clear cuttings.

Unselected: No color sort has been done, material will vary in percentage of heartwood and sapwood.

Cherry Color Grading

Cherry is typically sold red-1-face in the cuttings. The color of heartwood varies from light to dark depending on grades and region. Red Cherry can be defined between buyer and seller, with a specific percentage attributed to both the front and reverse faces that is red in the cuttings. For example, 95/50 would indicate that 95% of the boards would be red on the front face and that a minimum of 50% of the boards would be red on the reverse face. Please speak to your Sales Representative to match the product to your application.

Maple Color Grading

#1 White: Both faces and edges must be all sapwood within the cuttings of the grade.

#2 White: One face and both edges must be sapwood and a minimum of 50% sapwood on the reverse face within the cutting of the grade.

Sap 1 Face: Minimum of one face sapwood in the clear cuttings.

Brown: Material remaining after previous sorts will be primarily heartwood. It may also include stain and sticker shadow.

- Color Sorted Hard Maple available:
  - #1 White
  - #1 and #2 White
  - Sap-1-Face
  - Sap and Better
  - Brown

- Color Sorted Soft Maple available:
  - #1 and #2 white
  - Sap and Better
  - Unselected
  - Brown

Oak Color Grading

Oak is typically identified in the industry as Red Oak or White Oak. But in fact, there are many different species of Red Oak that have different color characteristics. In addition, the color and texture of the wood will be affected by the specific growth region.

As a result, to determine the appropriate color for your application, it is important to consider region (Northern, Appalachian or Southern), mill, sort and specifications. Please consult with your Sales Representative to ensure you receive the product that meets your requirements.

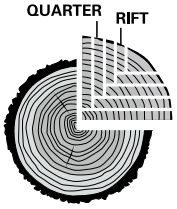
RIFT AND QUARTER SAWN MATERIAL

Quarter Sawn (QS)

- Yields straight grain, narrow boards and fleck or figure which runs across the grain. Fleck is noticeably present in Oak, but not discernable in Ash, Cherry, Hard Maple and Walnut.
- Quarter Sawn wood has growth rings at 60°-90° angle to the face of the board.
- Some Quarter Sawn lumber is also produced when lumber is Plain Sawn.

Rift Sawn (RS)

- Produces small flecks caused by cutting through the wood rays.
- Reduces the yield of the log and therefore increases the cost.
- Rift Sawn wood has growth rings at 30° to 60° angles to the face of the boards.
- Rift Sawn lumber is desirable when straight grain material is required without prominent fleck.
- Some Rift Sawn lumber is also produced when lumber is Plain Sawn.



Plain Sawn (PS)

- Most common type of lumber sawn, yielding broad grain, and wide boards.
- Plain Sawn wood has growth rings that are under a 30° angle.

How is quarter sawn lumber achieved?

There is only one true way to quarter saw a log. First the log is cut into quarters. Next, each quarter is processed by cutting a single board off of one face, then cutting the next board from the opposite face and finally cutting from alternating faces until the quarter is completely cut.

Quartered lumber provides great dimensional stability for its final application:

- Reduces shrinking and swelling in lumber width
- Reduces twisting, warping and cupping
- Less prone to surface checking
- Wears more evenly in flooring applications
- Does not allow liquids to readily pass through it
- Holds paint better
- Produces smooth srufaces as raised grain is not pronounced

PLYWOOD GRADING BASICS

The Interim Voluntary Standard for Hardwood and Decorative Plywood published by the Decorative Hardwoods Association (DHA) establishes nationally recognized classifications, quality criteria, definitions and product designation practices for plywood produced primarily from hardwoods. However, suppliers can set their own standards to meet the needs of their customers.

Our trained sales staff will consult with you to help you determine which product is best for your specific application, which can include providing customized front and back faces.

The following information provides a quick overview of the DHA face and back grade quality definitions.

Front Face

Grade AA

- Architectural grade.
- The best quality face grade for high-end applications such as architectural paneling, doors and cabinets.
- Veneer is matched for highest consistency of grain pattern and color.

Grade A

- Where excellent appearance is very important, as in cabinets and furniture.

- The veneer is generally composed of entirely heartwood or sapwood unless specified for natural or determined by the species or cut.
- Veneer is matched for both grain pattern and color.
- Minor infrequent burls, pin knots and inconspicuous small patches are allowed.
- Frequency of the defects depends on the species

Grade B
- Where the natural characteristics and appearance of the species are desirable.
- Heartwood and sapwood characteristics are similar to Grade A, however, it is matched for color only, not grain.
- Allows for more numerous and larger burls, pin knots and color streaks.

Grades C, D, E
- Where the application will have parts of the surface hidden or a more natural appearance is desired.
- Provides sound surfaces, but allows unlimited color variation, and the number and size of the
- repaired defects increase from C to E, respectively.

Back Face

Grade 1
- Allows some color variation.
- Sound tight knots cannot exceed 3/8" in diameter.
- No putty-filled knotholes (repaired pin knots allowed).
- Wormholes and splits must be filled.

Grade 2
- Color is not a consideration.
- Sound tight knots cannot exceed 3/4" in diameter.
- Repaired knotholes up to 3/2" are permitted.
- Wormholes allowed.

Grade 3
- Sound tight knots cannot exceed 1 1/2" in diameter.
- Repaired knotholes up to 1" are permitted.

Grade 4 (Reject Back)
- Not sound.
- Allows for many open knots.

Shop Grade
This grade contains minor imperfections such as a broken corner, a small area of void, a sanding error or other manufacturing defects. Shop grade will typically yield 85% usable material. Mills are allowed to ship up to 10% shop grade mixed in with a standard order of on grade plywood. If a unit is put up as a mill run, then there is no limitation on the amount of shop that can be included.

Color Sorts

White
- When referring to color and matching, veneers containing all sapwood, ranging from pink to yellow.

Red
- When referring to color and matching, veneers containing all heartwood, ranging from light to dark.

TYPES OF CORES

Veneer Core (VC)
Veneer core consists of one or more (usually odd number) plies of wood veneer. Each sheet is laid with the grain direction at a right angle to the adjacent sheets. Usually, inner ply veneer species are made with widely available low cost species like: Fir, Poplar, Aspen or Pine. Imported species could include: Ceiba, Lauan, Virola or Fuma.
- Excellent screw holding ability and lightweight.
- Slight variation in thickness may occur.

Medium Density Fiberboard Core (MDF)
MDF core is manufactured from pressure cooked wood chips which are broken down into fibers and combined with resin and wax and pressed into panels. Since MDF uses wood fibers, the end product is solid – the compressed fibers make it very dense. It can be machined or sanded to a smooth finish. It is heavy, however, at about 96 pounds per 4' x 8' x ¾" panel. It is typically almost twice as heavy as veneer core plywood.
- Smooth finish, cuts well but heavy in weight.

Particleboard Core (PB)
Particleboard core is constructed from wood particles rather than processed fibers. The wood particles are blended with resin and wax and pressed into panels. It is firm and solid throughout and makes a good core for hardwood plywood. Because of the larger wood particles, however, it will not machine and sand as well as MDF or veneer core. It is also heavy at about 93 pounds per 4′ x 8′ x ¾″ panel.

- Inexpensive, stable and smooth finish.

X-banded Core
X-banded core is constructed with a VC center with a thin layer of MDF on either side.

- Good screw holding ability.
- No telegraphing because of MDF outer layers.
- More expensive than most other cores.

Hardboard Core
Hardboard core is a composite panel manufactured primarily from inter-felted lignocellulosic fibers consolidated under heat and pressure. Other materials may be added during the manufacturing process to improve certain properties, such as resistance to abrasion and moisture, and increased strength and durability. Hardboard is grainless, with uniform thickness, density and appearance.

Lumber Core
Lumber core is constructed from sawn wood or sliced boards, three to four inches wide and of random length. It is joined at the edges with pressure sensitive glue and sanded to a uniform thickness. Lumber core is normally manufactured with cross bands of lauan veneer.

TYPES OF CUTS

Plain Sliced (PS) / Flat Cut (FC)
Slicing is done parallel to a line through its center, which produces a very unique light multicolored pattern and is quite unique. Typically found in all species except Maple and Birch.

Rotary Cut (RC)
The log rotates toward the blade and is peeled in long, wide sheets. This cut produces veneers with very distinctive grain patterns. Typically found in Maple and Birch unless specified.

Quarter Cut (QC)
The quarter slicing cut produces a straight grain effect. The quarter log is mounted on the flitch table so that the growth rings hit the blade at right angles. Notably in Oaks.

Rift Cut
The cut is made at a slight angle in relation to the position of the quarter log. This brings about a comb or rift effect. Sometimes referred to in species like Fir as Vertical Grain (VG).

Half-Round Slicing
A variation of rotary cutting, the quarter log is mounted on a stay-log, giving a cut that slightly crosses the annual growth rings.

Horizontal Slicing
A stationary blade slices lumber in a horizontal fashion to produce a multicolored pattern.

CUSTOM MATCHING

Whole Piece Face (WPF)
A single sheet of rotary cut veneer that reveals a continuous grain pattern throughout the sheet. Typically specified in Maple and Birch only.

Book Match (BM)
Every other leaf is turned over like the pages in a book. It creates a symmetrical pattern and a series of pairs. Typically found in Plain Sliced (PS) AA, A and B faces only.

Slip Match (SM)
Adjacent sheets of veneer are placed side by side, in their natural order, without being turned. The result is a uniform look.

Pleasing Match
Components are arranged based on the similarity of their colors rather than their grain characteristics.

Plank Match / Random Match
Generally, components of different widths and coming from different logs, spliced, in a way to simulate an effect of lumber put side by side (solid wood).

Special Match
A number of special patterns can be created upon request by a customer, including diamond point.

Sequence Match and Numbered (Seq Match & Nbr)
A method of arranging veneer faces such that each face is in order relative to its original position in the tree and, therefore, contains features if grain and figures similar to adjacent faces. Three or more related faces are required to constitute a sequence.

VENEER HELPFUL TIPS

- Face grades are represented by letters of the alphabet. Back grades are represented by numbers. Depending on your specific application, you may request Face Grades or Back Grades on both sides of the panel.
- "Good 2 Sides" (G2S) has a variety of meanings. For example, C2 sheet could be considered a G2S since it is a sound panel, however this may not work for certain applications.

  Due to this fact, your sales representative will ask you what is acceptable for your application. We want to know what is acceptable to you for color, flitch size, size and amount of pin knots, rough grain or other defects in order to get you the product that works best for your applications.
- Rotary cut is the only cutting method that is capable of producing whole piece faces.
- The barber pole effect: The alternating leaves in book matched faces may reflect light and accept stain differently, creating a noticeable color variation. This effect can be minimized through the use of proper finishing techniques.
- Slip matching eliminates the barber pole effect.
- Pre-sealing is beneficial for maple veneers to stop blotchy appearances and reduce the barber pole effect. It allows the stain to take more evenly.
- Availability of slip matched faces may be limited due to the general preference for book matched faces.
- Final panel edge trimming may alter the dimensions of the outside two-face components in balance and center matched panels.
- Higher grade hardwood veneers should be considered when high gloss paint finishes will be used.
- Natural color is allowed in any grade of Birch and Maple. Be sure to communicate your color preference to us when placing an order.
- Once a panel has been sanded, it must be finished. Extended exposure to air affects the color of many wood species.

GREEN PROGRAMS

FSC® CERTIFICATION

To earn the right for a product to carry the FSC label, every step in the supply chain between the forest and the final product must be FSC Chain of Custody certified. There are 4 types of FSC claims that our products can carry:

FSC 100% – products where 100% of the fibre comes from an FSC-certified forest

FSC Mix – products that are manufactured with a mixture of FSC-certified material with recycled fibre, and/or controlled fibre

FSC Recycled – products where 100% of the fibre is recycled, and a minimum of 85% is post-consumer recycled fibre

For more information, visit www.fsc.org

LEED

Leadership in Energy and Environmental Design (LEED), is redefining the way we think about the places where we live, work and learn. As an internationally recognized mark of excellence, LEED provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.

LEED certification provides independent, third-party verification that a building, home or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

We have LEED accredited staff members throughout our North American divisions. An increasing number of our products are qualifying for LEED points so please contact your Sales Representative for more information.

For more information, visit www.cagbc.org

CARB2/TSCA VI

CARB2 regulations ensure that the composite boards you are purchasing have very low formaldehyde emissions. Panel manufacturers, distributors, fabricators, importers and retailers share in the responsibility of maintaining a transparent chain of custody through to the end use consumer.

The TSCA Title VI regulation requires composite wood products to be third-party certified in a similar manner as required by CARB. After March 22, 2019, composite wood products must be labeled as TSCA Title VI compliant. These products include: hardwood plywood, medium-density fiberboard, and particleboard, as well as household and other finished goods containing these products.

ULEF AND NAF

Ultra-Low Emitting Formaldehyde (ULEF) and No-Added Formaldehyde (NAF) are specific types of composite wood products that qualify for exemptions from the regular testing requirements under both CARB2 and TSCA Title VI.

For more information, visit ww2.arb.ca.gov and www.epa.gov

TERMINOLOGY

Surface Measure (SM)
Surface measure represents the surface area of a board in square feet, for 1" thick lumber. The formula for calculating the surface measure is:

$$SM = \frac{\text{width (inches, uncluding decimal) x length (feet)}}{12}$$

$$\text{Example} = \frac{7.5'' \times 10''}{12} = 6.25 = 6 \text{ SM}$$

Foot Board Measure (FBM)
A board foot is the standard unit of measurement of lumber. A board foot represents one foot long by one foot wide by one inch thick or its equivalent. The formula for calculating board feet in a board is:

$$FBM = \frac{\text{width (inches, fractions) x length (feet) x thickness}}{12}$$

$$\text{Example} = \frac{6'' \times 16'' \times 5/4''}{12} = 10 \text{ BF}$$

1. The thickness of lumber is calculated prior to surfacing.
2. The lengths are only measured at the full foot mark, anything less than a full foot will be measured as the lower foot length.
3. Example: 11'11" would be tallied as a 11' board.

Milling

Surfaced 2 Sides (S2S)
Material that has been sent through the planner to be surfaced on 2 sides.

Surfaced 2 Sides, Straight Line Ripped 1 Edge (S2S1E)
Material that has been S2S and then sent through the rip saw to be straight line ripped on 1 edge.

Surfaced 2 Sides, Straight Line Ripped 2 Edges (S2S2E)
Material that has been S2S and then sent through the rip saw to be straight line ripped on 2 edges.

Surfaced 4 Sides (S4S)
Material that has been sent through a moulder to be surfaced on all 4 sides.

TOOLS

CONVERSION FORMULAS

Board Footage (FBM)

FBM = LF x width ÷ 12 x thickness

Example: To convert 3000 LF of 8" x 5/4 (1.25"); calculate 3000 x 8" ÷ 12' x 1.25" = 2500 FBM

Lineal Footage (LF)

LF = FBM ÷ width x 12 ÷ thickness

Example: To convert 1500 FBM of 6" x 6/4 (1.5"); calculate 1500 ÷ 8" x 12' x 1.5" = 2000 LF

Price/M FBM into Price/LF
Price/M ÷ 12 x width x thickness ÷ 1000 = Price/LF

Price/LF into Price/M FBM
Price/LF ÷ 12 x width x thickness x 1000 = Price/M

Board Footage (FBM) into Cubic Meters
FBM ÷ 424 = Cubic Meters

Cubic Meters into FBM
Cubic Meters x 424 = FBM

Price/m FBM into Price/Cubic Meters
Price/m ÷ 2.359 = Price/Cubic Meters

Price/Cubic Meters into Price/m FBM
Price/Cubic Meters x 2.359 = Price/M

All calculations based on Net Footage.

LUMBER WEIGHTS

Rough (Unsurfaced) Lumber Weights	
Species	Per 1000BF
Domestic Hardwoods	
Ash	3630
Alder	2435
Aspen	2346
Basswood	2157
Cherry	3064
European Beech (Pollmeier)	3755
Hickory	4392
Hard Maple	3745
Soft Maple	3223
Pacific Coast Maple	3030
Poplar	2630
Red Birch	3736
Yellow Birch	3736
Red Oak	3710
White Oak	4064
Walnut	3356
Imported Hardwoods	
Accoya® Radiata Pine	3100
Okouma	2869
Sapele	4038
African Mahogany (Khaya)*	3719
Genuine Mahogany*	3719
Teak	4250

* CITES Appendix II Restricted

Rough (Unsurfaced) Lumber Weights	
Species	Per 1000BF
Softwoods	
Cypress	2840
Douglas Fir	3017
Hemlock	2575
Eastern White Pine	2220
Ponderosa Pine	2485
Radiata Pine	2950
Alaskan Yello Cedar	2755
Western Red Cedar	2045

PLYWOOD WEIGHTS

	5/32"	3/16"	5 mm	1/4"	3/8"	1/2"	5/8"	3/4"	1"
MDF				33	50	67	83	100	132
PBC					48	64	80	96	126
VC	14	17	19	22	33	44	55	66	88
WC			21	24	36	48	59	71	96

Pounds per sheet based on 4' x 8' material.

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We are proud to be a member of the following organizations:

National Hardwood Lumber Association

International Wood Products Association

Composite Panel Association

North American Building Material Distribution Association

SIERRA

Sierra Forest Products

www.sierrafp.com

CONTACT US